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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/435,748	11/08/1999	JAMES P. BUCKLEY	N19.12-0028	5623

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EXAMINER	
RUTHKOSKY, MARK	

ART UNIT	PAPER NUMBER
1745	22

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/435,748	BUCKLEY ET AL.
	Examiner	Art Unit
	Mark Ruthkosky	1745

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-- The MAILING DATE of this communication appears on the c ver sheet with the c rrespondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 October 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *29-44,52-54 and 58-77* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *29-44,52-54 and 58-77* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Continued Prosecution Application

1. The request filed on 10/29/2002 for a Request for Continued Examination (RCE) under 37 CFR 1.114 of Application No. 09/435,748 has been entered. An action on the RCE follows.

Status of Claims

2. Claims 29-44, 52-54 and newly added claims 58-77 are active in the application

Claim Rejections - 35 U.S.C. § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 29-44, 52-54 and claims 58-77 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The instant claims use the phrase "less than about." This phrase is indefinite as "less than" defines a lower limit, while the term "about" contradicts the value of the lower limit. As shown in the MPEP, section 2173.05(b), the phrase "at least about" is held as indefinite.

Regarding claims 36, 38, 66 and 68, the word "derivative" renders the claim(s) indefinite because the claim(s) include(s) elements not actually disclosed (those encompassed by

"derivatives"), thereby rendering the scope of the claim(s) unascertainable. The identity of the derivations of the electrode material are unclear and include elements not actually disclosed. Thus, the scope of the claim(s) are unascertainable. As an example, lithium cobalt oxide is a claimed formula, however, lithium cobalt manganese oxide, which may be considered a derivative, is not disclosed. The word derivative renders the claim indefinite.

Claim Rejections - 35 U.S.C. § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371© of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

6. Claims 29-33, 39, 53, 58-63, 69 and 76 are rejected under 35 U.S.C. 102(e) as being anticipated by Dansui et al. (US 6,033,805.)

The instant claims are to a battery comprising a positive electrode, a negative electrode and a separator between the positive and negative electrodes wherein at least one of the electrodes has an average thickness of less than 10 microns and comprises a powder comprising electroactive particles having an average diameter of less than about 500 nm.

Dansui et al. (US 6,033,805) teaches a battery comprising a positive electrode, a negative electrode and a polymer separator between the positive and negative electrodes. An electrode has an average thickness of less than about 10 microns. For example, column 3, lines 5-10 shows an electrode layer of 10-60 microns on a collector foil and claim 16 shows a layer of 10-60 microns on each side of the foil. Using the lower limit, 10 μm on one or both sides is interpreted to be about 10 μm. The electrode active material comprises a powder of cobalt hydroxide electroactive particles having an average diameter of less than about 200 nm (see example 2 and claim 15.) The current collectors and separators have an thickness of about 10 microns (see example 1.) The active material may be the positive or negative electrode depending on the state of charge of the battery. The active material is mixed with a binder and conductive particles and is attached to a current collector (see the examples.) Thus, the claims are anticipated.

Claim Rejections - 35 U.S.C. § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. The rejection of claims 29-44 and 52-54 under 35 U.S.C. 103(a) as being unpatentable over "Thin Film Rechargeable Lithium and Lithium-Ion Batteries, Oak Ridge National Laboratory Bulletin, 9/1/1998 (referred to as, Oak Ridge), and further in view of Amata et al. (US 5,482,797) has been overcome by the applicant's amendment.

9. Claims 34, 35, 37, 38, 41, 42, 43, 44, 52, 54, 64, 65, 67, 68, 71, 72, 73, 74, 75, and 77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dansui et al. (US 6,033,805) in view of Satoh et al. (US 5,571,638.)

Dansui et al. (US 6,033,805) teaches battery comprising a positive electrode, a negative electrode and a polymer separator between the positive and negative electrodes. The electrode has an average thickness of less than about 10 microns. For example, column 3, lines 5-10 shows an electrode layer of 10-60 microns on a collector foil, and claim 16 shows a layer of 10-60 microns on each side of the foil. Using the lower limit, 10 μm on one or both sides of the foil (~20μm) is interpreted to be about 10 μm. The active material comprises a powder comprises cobalt hydroxide electroactive particles having an average diameter of less than about 200 nm (see example 2 and claim 15.) The current collectors and separators have an thickness of about 10 microns (see example 1.) The active material may be the positive or negative electrode depending on the state of charge of the battery. The active material is mixed with a binder and conductive particles, and is attached to a current collector (see the examples.) Dansui et al. (US

6,033,805) does not teach the specific electrode materials and current collectors described in the dependent claims of this rejection.

Satoh et al. (US 5,571,638), however, teaches a battery comprising a positive electrode, a negative electrode and a polymer separator between the positive and negative electrodes. The active material comprises a powder comprises lithium transition metal oxide electroactive particles having an average diameter of less than about 500 nm (see example 2 and claim 15), a conductive powder and binder (see claims 1-10.) The anode material is a carbon powder with a size ranging from 10 nm to 50 micron (see the paragraph bridging cols. 3-4.) Current collectors of stainless steel, copper and aluminum are noted in col. 7, lines 55+. Polymer separators having an thickness of about 10 microns are noted (see example 8 and col. 8, lines 1-45.) The active material may be the positive or negative electrode depending on the state of charge of the battery. The active material is mixed with a binder and conductive particles, and is attached to a current collector (see the examples.)

It would be obvious to one skilled in the art at the time the invention was made to prepare materials with nanometer sized particles as these methods are taught in the art as described. Further, it would be obvious to prepare electrodes with various thicknesses as the small particle sizes will allow for electrodes with an average thickness of less than about 10 microns, as taught in Dansui et al. (US 6,033,805.) One of ordinary skill in the art would have the knowledge to use the electrode materials of Satoh et al. (US 5,571,638) in a thin electrode battery as taught Dansui et al. (US 6,033,805) as it is clear that electrodes can be prepared with an average thickness of

less than about 10 microns. In addition, one of ordinary skill in the art would have the knowledge to incorporate the thickness of the electrodes of Dansui et al. (US 6,033,805) into the thin battery of Satoh et al. (US 5,571,638) as the small particles will allow for the production of a thin electrode with binders and conductive particles. The use of various current collectors would be obvious as each are well known in the art to conduct current from an electrode material.

Dansui et al. (US 6,033,805) and Satoh et al. (US 5,571,638) are silent to the surface roughness of the separator, however, Satoh et al. (US 5,571,638) teaches the surface roughness of the current collectors to be 0.1-10 microns to increase bonding. It would be obvious to one skilled in the art at the time the invention was made to have materials in the electrode assembly with a surface roughness of 0.1-10 microns to increase the bonding of the materials. The current collector is bound to the active material in the same manner the separator is bound to the active material on the opposite side of active material. One of ordinary skill in the art would recognize that a surface roughness of 0.1-10 microns would increase the bonding and adherence of the materials in the electrode assembly.

With regard to claims 44 and 74, Dansui et al. (US 6,033,805) and Satoh et al. (US 5,571,638) do not teach the electrode current collector to be made of graphite paper, however, it would be obvious to one of ordinary skill in the art at the time the invention was made to use graphite paper as a current collector in the batteries of Dansui et al. (US 6,033,805) and Satoh et al. (US 5,571,638.) Graphite is a well described electron conductor as shown in both references. The electrode current collectors taught in the references are used to transfer electrons to and from

the electrodes. One of ordinary skill would recognize that a graphite sheet or paper will provide the same means for transferring electrons to and from the electrodes as the metal sheets described in the references.

10. Claims 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 53, 64, 65, 66, 67, 68, 70, 71-73, 76, 77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dansui et al. (US 6,033,805) in view of Kawakami et al. (US 6,165,642.)

Dansui et al. (US 6,033,805) teaches battery comprising a positive electrode, a negative electrode and a polymer separator between the positive and negative electrodes as previously described. Dansui et al. (US 6,033,805) does not teach the specific electrode materials and current collectors described in the dependent claims of this rejection.

Kawakami et al. (US 6,165,642) teaches a rechargeable lithium battery comprising a positive electrode, a negative electrode and a polymer separator between the positive and negative electrodes. The electrode includes an active material comprising a powder of lithium transition metal oxide electroactive particles having an average diameter of less than about 500 nm (see examples 2-4 and claim 1), a conductive powder and binder (see claims 1-18 and examples 1-4.) The size distribution of the active material is between 0.5 to 50 nm in examples 2-4. The anode material may be a transition metal oxide, lithium material or a carbon powder (see col. 9.) Solid and gel electrolytes may be used in the cell (see col. 10.) Current collectors of stainless steel, copper and aluminum are noted in col. 9 and the examples. Polymer separators are noted in the examples. The active material may be the positive or negative electrode depending

on the state of charge of the battery. The active material is mixed with conductive particles and attached to a current collector (see the examples.)

It would be obvious to one skilled in the art at the time the invention was made to prepare materials with nanometer sized particles as these methods are taught in the art as described. Further, it would be obvious to prepare electrodes with various thicknesses as the small particle sizes will allow for electrodes with an average thickness of less than about 10 microns, as taught in Dansui et al. (US 6,033,805.) One of ordinary skill in the art would have the knowledge to use the electrode materials of Kawakami et al. (US 6,165,642) in a thin electrode battery as taught by Dansui et al. (US 6,033,805) as it is clear that electrodes can be prepared with an average thickness of less than about 10 microns. In addition, one of ordinary skill in the art would have the knowledge to incorporate the thickness of the electrodes of Dansui et al. (US 6,033,805) into the thin battery of Kawakami et al. (US 6,165,642) as the small particles will allow for the production of a thin electrode with binders and conductive particles. The use of various current collectors would be obvious as each are well known in the art to conduct current from an electrode material.

11. Claims 36 and 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dansui et al. (US 6,033,805)in view of Kawakami et al. (US 6,165,642) as applied above, and further in view of Miyasaka et al. (US 6,037,095.)

With regard to claims 36 and 66, Kawakami et al. (US 6,165,642) teaches the anode material may be a transition metal oxide, lithium material or a carbon powder. Kawakami et al. (US 6,165,642) does not specifically teach tin oxide as an anode material, however one of ordinary skill in the art would recognize that tin oxide is a well known transition metal oxide used as an anode in lithium secondary cells. For example, Miyasaka et al. (US 6,037,095) teaches a lithium ion secondary battery with a tin oxide anode or negative electrode (see claim 2.) It would be obvious to one skilled in the art at the time the invention was made to use tin oxide as the transition metal oxide anode material of Kawakami et al. (US 6,165,642) as tin oxide will allow for the equivalent transfer of ions in the battery as the transition metal oxides of Kawakami.

Response to Arguments

12. Applicant's arguments filed 10/15/2001 have been fully considered, but are moot due to the new rejections.

Examiner Correspondence

13. Any inquiry regarding this communication or a previous communication should be directed to Examiner Mark Ruthkosky, whose telephone number is (703) 305-0587 or his supervisor, Patrick Ryan, whose phone number is (703) 308-2383. Please note that Examiner

Ruthkosky and SPE Ryan out of the office each Friday of bi-week period. The PTO official fax number is 703-872-9310, while the PTO after-final fax number is 703-872-9311.

Mark Ruthkosky
Patent Examiner
Art Unit 1745

12/10/02